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Gas Fireless Cooking.

H. THURSTON OWENS.

It has taken the American public over 50 years to become even slightly familiar with the greatest time, labor and fuel saving device that has been developed during that period.* There are 20 million cooks in the United States, and the daily labor performed represents the largest single item of industry in the country. Any device that conserves time, labor and fuel in this field, can rightly be called the greatest industrial improvement.

The kitchen of the American housewife is the citadel that must be conquered, if we are to become a truly efficient nation. No place in our industrial, domestic or our spiritual life takes as much of our time, our money or our thought. The kitchen is not only the place where food is prepared, but in the majority of homes it is the place where the heating plant is located and used for 8 out of the 12 months.

The United States Government† says that the advantages of the fireless cooker include
- time saving,
- better foods,
- comfort,
- fuel saving.

Food and heat total larger than any other two items in the expense account of the average family, so that the importance of the gas fireless cooker should receive the thoughtful attention of the gas industry.

It is not only necessary that gas men give thought to the fireless cooker, but it also behooves them to approach the subject with an open mind. The attitude of the average gas manager is indicated by a discussion at a Gas Convention several years ago. The question Box at this meeting included this query. "What has the fireless cooker done for the gas range?" One of the members immediately stated that the question should have read: What has the gas range done for the fireless cooker? While this was before the days of the gas fireless cooker, the importance of this method of preparing food was ignored by the industry that assumed to lead the country in domestic science.

The British Commercial Gas Association has issued a bulletin, advocating the use of the fireless cooker. The American Gas Institute recently reported that the fireless cooker had no merit worth considering; and the National Commercial Gas Association has been silent on the subject.

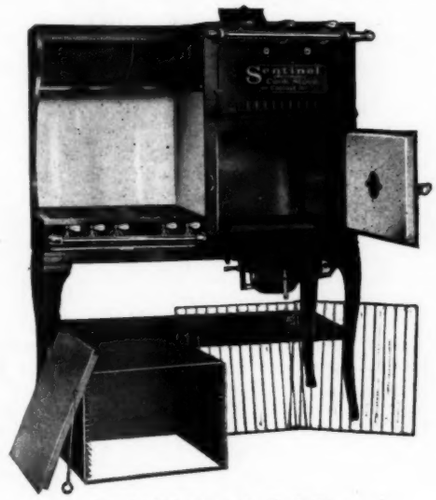
OBJECTIONS TO THE FIRELESS COOKER.

In gathering data for this article the writer interviewed a number of gas men, and their views on the fireless cooker may shed some light on the almost universal apathy. I quote some of them:

An Educational Leader.—"So few things may be cooked that way that it does not pay. Expensive cuts of meats have more nutrition than cheaper cuts, and it pays to buy the more expensive kind.

A Gas Range Manufacturer.—"Fully 85% of your cooking is done on the top and only 15% in the ovens, therefore if you save 50% of the fuel used in the ovens your total fuel saving would only be 7½%."

A Gas Association Manager.—"If the fireless cooker took so little labor my wife would have nothing to do, and as she sees all of the 'movies' in our neighborhood now, she would become dissatisfied and want to move to the city."



Sentinel Automatic Cook Stove.

This range has time clock which automatically cuts off the supply of gas, at a time predetermined. It works the same as an alarm clock. The soap stone at the bottom of the oven absorbs the heat from the burners and then distributes it slowly, after burners are shut off. The Automatic oven operates as follows:

Food, if desired a whole dinner consisting of soup, roast, vegetables and pudding, are placed in the oven cold. The clock is set for a length of time as given in the Sentinel cook book. The gas is lighted and the oven door closed. At the expiration of the time set, or when the pointer reaches zero, the cam trips a mechanism which shuts off the gas and closes the flue damper. The stones by that time are very hot and continue the cooking for a long period. The advantages are, economy of gas (one burner for a short period cooks the whole meal), no necessity for attention (can be left for hours and still the dinner is taken out hot and perfectly cooked). Full flavor of foods retained.

Heat retaining qualities of oven are sufficient to provide for any variety of cooking. For instance: An empty oven with stones in place reaches temperature between 450° to 500° when gas is burned for 30 minutes. Two hours after the clock shuts off the gas, the temperature within the oven is still about 300°. If food is in the oven, these figures vary with the quantity of food. The temperature does not rise as quickly, neither does it diminish as as rapidly. A dinner placed in the oven at 9 o'clock can be forgotten until 12 or 12:30 when it is still piping hot and ready to be served.

* At the Worlds Fair, in Paris, in 1867, a Norwegian automatic cooker was exhibited. Invention ahead of the times. "Scientific American," October 28, 1911. † U. S. Department of Agriculture, Form 776, 1-25-16.

A Domestic Science Teacher.—"The fireless cooker can only be used successfully by adopting new methods of cooking, and the average house-wife has discarded the cooker rather than change her methods. There is no question as to its value as a time, labor and fuel saver."

What Fireless Cooking Means.

Fireless cooking does not possess all of the virtues of Vulcan, Jupiter and Minerva. It will not produce efficiency where sloth dwells, nor will it provide intelligence where brains are nil. Fireless cooking is simply a method whereby the thoughtful intelligence of America's educated women can be successfully applied to relieve them of useless expenditure of energy, and effect a saving of time and a reduction of fuel bills. Fireless cooking does all these things, and that is why it will pay interest and depreciation on the investment and leave a balance on the profit side of the ledger. It will not pay its way in fuel bills alone, and any such claims should be frowned upon.

What Cooking Is.

In cooking, we	Boil	Bake
	Stew	Fry
	Roast	Broil

The present type of gas range is properly constructed to accomplish all of these things, and the method of doing the last three will have to be continued for some time at least. They are the rapid cooking methods, and require but a small portion of the total fuel used, very little time and only a little head work. For 90% of our cooking, however, there is abundant opportunity to save fuel by conserving it; to save labor attending to it, and save time watching it.

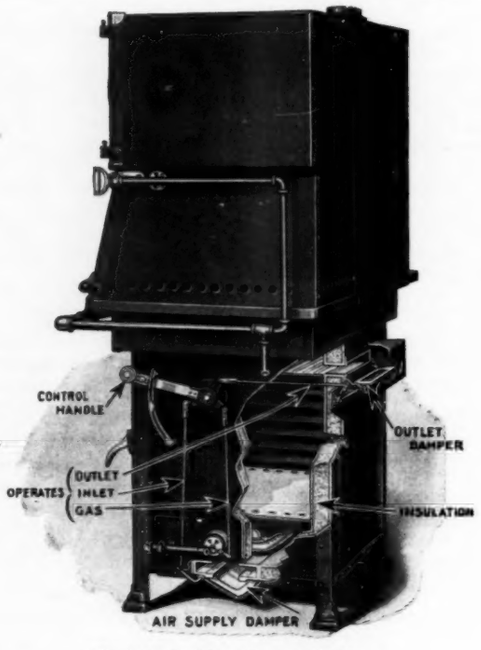
Where the Saving is Made.

Stated in other words, we can save fuel by placing our food in cooking utensils and compartments that radiate heat very slowly. We can use an automatic attachment that cuts off the gas supply when sufficient heat has been applied; and as food so placed needs no attention while cooking, the house-wife will be free for many hours a day, now given over to "watchful waiting."

Some idea of the saving in fuel consumption may be obtained if we use the roast of beef as an example. In ordinary practice the gas is first lighted, the roast is placed in the oven and for about half of the cooking time the gas is burned at full capacity, while for the latter half it may be partly turned down. The reason for this method is that the meat must first be heated thoroughly and then kept at a good temperature to complete the cooking process. If we substitute the fireless cooker, all that we do is to insulate the oven so that a smaller quantity of gas will be needed to get it up to the initial temperature, and after this has been attained all of the gas may be turned off as the heat will be retained. It makes no difference in result whether you maintain the temperature by keeping the flame going or by keeping the heat from being wasted.

To go to the other extreme, we find that corn must be cooked over a hot, quick fire and the insulated oven will not be of any advantage. We cannot cook everything to better advantage in the fireless cooker, but the things that take the most fuel and time are best cooked that way.

The fireless cooker is a gas range with a college education. ("Apologies to the Eclipse Stove Company.")



Fireless Cooking Oven at Bottom.

Regular Cabinet Above.

Clark Jewel Heat Holder Gas Oven.

The Clark Jewel Heat Holder or Fireless Cooking Oven is made as a part of a regular cabinet gas range, equipped with a sensitive mercury thermometer, and the person doing the cooking turns off the gas when the desired temperature is reached. The proper temperature for different kinds of food is given in the Clark Jewel Cook Book.

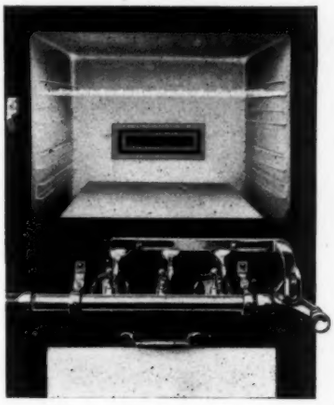
When the proper temperature is reached the control lever is moved to position marked "Gas Off—Dampers Closed" and the oven is now a Fireless Cooker.

No further attention is necessary. Cooking will continue for several hours, and the result will be perfectly cooked food. Bread, cake and pie can be nicely browned. Meat, vegetables, bread, in fact all kinds of food, can be cooked at the same time in the same oven.

A minute before opening door put lever to "Gas Off—Dampers Partly Open." This will let odors of cooking and accumulated steam go up the flue instead of into the kitchen.

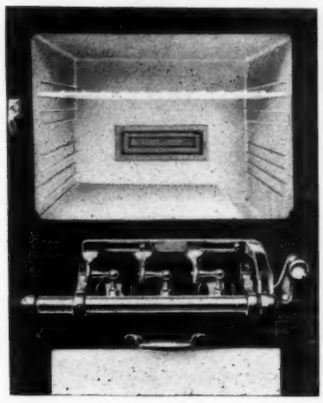
The Hay Box.

In 1905, George H. Murphy, Consular Clerk at Frankfort,



Gas turned on—heat circulating through oven.

This shows the normal position of the oven bottom, flue damper and fireless cooker control lever when the oven is being used in the ordinary way, either preparatory to baking or roasting with stored heat or in some short baking operation. Heat from the double burner enters the oven through openings at both sides of the oven bottom, circulates through the oven, and exits through the flue damper in the back wall.



Gas turned off—oven converted into a fireless cooker.

This shows the oven after it has been heated to the required temperature, the gas turned off, and the control lever thrown up. One movement of the control lever closes the flue damper and slides the oven bottom over to the left side wall, making the oven an air-tight, heat-tight compartment.

ESTATE FIRELESS COOKING GAS RANGE OVENS.

The Estate method of safety control of the Oven is illustrated above. When gas is on, the oven dampers and flues are open. In order to close the flue, it is necessary to turn off the gas.

Germany, reported* at some length on the "Hay Box," or fireless cook stove. These cooking boxes were filled with hay or lined with felt, but in spite of their somewhat crude construction, were extensively used in Germany. In summing up, the advantages were given in 14 different reasons, the principal ones being:

Saving in fuel.
Increased life of pots.
Food better cooked, more tasty, more nutritious and more digestible.
No odors.
No scorching or burning of food.
Less house work.
No heat in Summer.
Same meal can be served to the several members of a household at different hours without reheating.

THE USE OF A FIRELESS COOKER.

A very good idea of the limitations as well as the value of the fireless cooker may be had in the paper issued by Cornell University. The authors Helen Canon and Lucile Brewer cover this phase as follows:

Position 1. Position 2. Position 3.

CHAMBERS FIRELESS COOKING HOOD.

The Chambers Fireless Cooking Gas Range, has an insulated oven and the regulation broiling oven and top burners, and in addition, a Fireless Cooking Hood.

An ordinary cooking top burner is placed above a composition asbestos plate at the back of the cooking top. Food is placed in vessel, gas lighted, and when it comes to a boil, the hood is lowered. When hood reaches position 2 the gas must be turned off, before hood can be lowered to the final position.

Food cooked this way may require a little longer time than if boiled in the regular way, but it will neither scorch, burn nor dry out for the want of attention. The insulated hood retains the moisture, and the food will not dry out or burn.

* Monthly Consular Report, No. 295, Dept. of Commerce and Labor, April, 1905.

The Eco-Thermal Range.

THE MANUFACTURERS SAY OF THIS RANGE.

"It is not a fireless cooker, but an entirely new principle. It is so constructed that the oven receives heat from five sides, thus producing a dead heat without any circulation of air in the oven. Ninety per cent. efficiency is claimed for this oven and, being insulated, it retains the greater portion of this heat for some hours after the gas has been turned off. For a meat roast that ordinarily takes two hours to cook, the gas is burned for forty minutes under the oven and then turned off. The heat being retained in the oven finishes the cooking. The gas fumes do not come into contact with the food, and 25 per cent. of the food is saved through elimination of evaporation."

It will be noted that the products of combustion pass around instead of through the oven. Otherwise the fireless cooker principle is retained.

"The fireless cooker, like any other piece of equipment, should be used intelligently in order that the best results may be obtained. As previously stated, for certain cooking processes and under certain conditions it may be no more economical in fuel, time or labor, than is the ordinary range; therefore, fireless cookery should be studied carefully by the housewife in order that she may discover its best applications. A few experiments with various kinds of foods, based on recipes adapted to the use of a fireless cooker, are necessary in order to give one the desired mastery.

"The efficiency of insulation, the quantity of food, and the rapidity of the transfer from the stove to the cooker influence the length of time required for the cooking. The temperature to which the radiator is heated also determines to a certain extent the length of time the food should remain in the cooker. The period that gives the best results is more or less definite for each food. However, since individual tastes differ, definite statements in regard to the required time should be verified for each household.

"Care should be given to correct proportions, because there is no opportunity for the evaporation of excess moisture in the cooker.

"Foods, such as pancakes, that require rapid cooking over a hot fire, are not suited to the fireless cooker method. Biscuits may be successfully baked in the cooker, but since the heat required to raise the radiators to the proper temperature will bake the biscuits in an ordinary oven there is no justification for its use in this case. For foods that require long cooking in order to be made more palatable and digestible, the fireless cooker is adminably suited.

"Cereal products, such as rolled oats, cracked wheat and hominy, give excellent results when cooked in a sufficient quantity of water in a fireless cooker. The first rapid cooking on the stove bursts the starch granules; the long-continued, slow cooking in the fireless cooker softens the fibre and completes the cooking of the starch, thereby making the nutritive matter available for use by the body.

"The tough, and consequently cheap, cuts of meat are equally as nutritious as the more tender and more expensive cuts, but they require long cooking at a low temperature in order to be palatable. Intense heat shrinks and hardens meat fiber. The extraction of meat juices for soup, which necessitates long cooking at a low temperature, is well accomplished in the fireless cooker. If it is desired to retain the juices in the meat, the outside of the meat should be be seared for a few minutes at a high temperature; the meat then should be cooked at a temperature somewhat below the boiling point of water until it becomes tender. The meat should be thoroughly heated to the very center before being transferred to the cooker. Fowls are especially good when cooked by this long, slow method.

"Steamed breads and puddings are well adapted to the fireless-cooker method.

"Hot beverages and sauces may be set aside in the cooker to be kept hot for serving.

"The use of the fireless cooker for canning fruits is recommended by some persons. The juice of fruits may be satisfactorily extracted for jelly making. Various conditions, however, determine the practicabilty of its use for this purpose."

TYPES OF GAS FIRELESS COOKERS.

Ordinary fireless cookers consist of an insulated box wherein partly cooked or heated food, together with a heating element is placed, and the cooker sealed. In gas operated types the fuel is burned, the heat retained and the food cooked in the same compartment.

Electric ranges operate on the fireless cooker principle, and until proper methods of insulation were developed these appliances were not commercially successful. Fireless cooking has made electric cooking possible.

Three methods of cooking by retained heat have been developed in the gas operated fireless cookers on the market.

A—Insulated oven, circulating type, the heat being conserved by soapstone bottom or by special oven linings.

B—Insulated oven, closed type, the heat being applied to the outside instead of inside the oven linings. The object of this is to maintain the temperature by reducing the quantity of water vapor, which has a cooling effect.

C—Insulated hood, the heat being applied to the food placed in an ordinary pan or kettle. After the food comes to a boil the hood is lowered over the receptacle and the gas turned off.

The appliances so far developed demonstrate that the simplest method of increasing the efficiency of the top burners of a gas range is to do away with them and adopt a more efficient method of cooking.

WHAT YOU CAN DO.

Every infant industry needs assistance, but getting an innovation established in the gas business needs dynamite. If every gas manager would purchase a gas fireless cooker, make it a present to his wife on some befitting occasion, such as Christmas, or a birthday, and treat it with the same deference as the new "Twin-six"—for it is an invention of greater merit—then we would see fireless cooking established in a single season.

Unless gas companies take vigorous steps to promote the sale of gas fireless cookers, the cooking business will soon be in the same condition as the lighting business. It will be used by the small consumer, as the better class can *now* obtain satisfactory results by the electric method.

Experience with Boiler Graphite.

In taking charge of this works, 6 years ago, I found two 120-horse power, return-tubular boilers, with an accumulation of scale ⅛ to ¼″ in thickness. I tried boiler compound and scaling tools, using a number of compounds during the six years. Our boilers are in continuous 24-hour service, and are blown down every 12 hours. During the summer season, both boilers are in continuous service for about 95 days, with no spare boiler to cut in, in order that boilers may be cleaned.

In May, 1913, by mere accident, I read an article by an engineer who had the same trouble with scale that I was having. He had entirely removed the scale from his boilers with boiler graphite, and at the time the article was written none was forming.

I immediately got 100 pounds of the grade of graphite suggested, and I began using it in both boilers. I was afraid to use according to directions, fearing to precipitate the scale in such quantities as to be dangerous; so I used only 4 ounces in 24 hours in each boiler, following directions as to blowing down; which were, blow each boiler down once every 12 hours.

We opened No. 2 boiler 93 days after beginning the use of graphite, and cleaned thoroughly, removing 25½ pounds of scale. About a week later, we cleaned No. 1, removing 49 pounds of scale. The tubes and sheets of both boilers have a thin coating of graphite, which prevents new scale from forming.

In 1912, both boilers were in service at the same time of year and about the same number of days as in 1913, and when they were cleaned, we removed from each 350 pounds of scale.

I am still using graphite. Both boilers are in fine condition, and so pronounced by the Boiler Insurance and Inspection Company.

—*Frank B. Speace, in "Graphite."*

Character in Public Utilities.

Address to the Mid-Year Conference, N. C. G. A., by MR. N. T. GUERNSEY.

The invitation to address your association was peculiarly acceptable to me. My relations, both business and personal, with your President, Mr. Haines, have been long continued and intimate, and have brought with them an accurate appreciation of his eminent qualifications as a business man and as a friend and associate; and in addition to this, although my energies are now devoted exclusively to the telephone industry, I congratulate myself upon what I believe to be my right to still consider myself, in a sense, identified with the gas industry. The professional work that I have had the opportunity to do for gas interests has been as strenuous and as absorbingly interesting as any work I have ever done, and has, it has seemed to me, had a most important influence upon my professional development. I, therefore, take pride in claiming the right to class myself as one who is not wholly disconnected from the gas interests, and hope that this claim will be conceded, not controverted.

There is no one thing in the affairs of a public utility that is of more far-reaching importance than its relation with the public it serves. This proposition, like almost every other proposition that is true, is not new. It is as old as business transactions and relations. There is nothing complex in it. It is as simple as self-interest. The notable thing about it is that until a comparatively recent date, it has not been given the general recognition in connection with the affairs of public utilities which its importance demands, and which it has received in other avocations. The men who directed the interests of the public utilities of this country 50 years ago, and who had charge of these interests from that time until 10 or 20 years ago, were not deficient in either business sagacity or experience, and yet, if we are frank with ourselves, we must concede that many of the difficulties that public utilities are now encountering and which have been serious factors in their recent experience, have grown out of the failure to give due weight to this almost obvious matter of public relations.

What has been recognized as fundamental in other avocations as long as business has existed, has received curiously small attention from public utilities. Ever since there have merchants or manufacturers, they have recognized the importance of the good will of their customers; ever since there have been bankers, bankers have taken into account and have been influenced by the interests of those whom they serve; even in the days when the ethics of the profession would not permit a lawyer to render a bill and he was compelled to accept for his services whatever his client might choose to bestow upon him as an honorarium, the lawyer could not afford to disregard the good will of his clients; there never has been a time when physicians have failed to recognize the importance of their personal relations with their patients; even the clergyman cannot be indifferent to the feelings of his parish.

The extent to which public utilities In the past have failed to recognize the entirely obvious fact that the same rule which applies to every other business applies to them, and to govern themselves by this rule, is astonishing. It is only recently that the influence exerted upon the business of a public utility by its relations with the public it serves has been recognized as a factor of almost controlling importance in the success or failure of its enterprise.

The public is not, and in the very nature of things cannot be, indifferent as to the utilities. Services that were once only conveniences have become, especially in the larger communities, absolute necessities. In the more populous cities every citizen is dependendent upon each of the utilities. He cannot live without light, or heat, or water, or transportation, or means of communication; and what is true of these centers is true, as a general proposition, although to a less degree, as to the smaller communities, and even as to the scattered farming population. The laws that have been enacted in almost all of the states creating commissions vested with greater or less jurisdiction in the regulation of public utilities, are a direct manifestation of the public estimate of the importance of matters pertaining to these services.

The commercial departments of our public utilities are the branches of the organizations brought into most frequent direct personal contact with the public. The considerations that have been briefly outlined, point to the policy which must underlie and characterize their work, if it is to be done successfully, and this means if it is to be done right. If it is done right, it will be successful, and if it is not done right, it cannot be a permanent success.

The single propositin that I wish to urge upon you to-day is that sound, enduring success in a public utility, exactly like sound and enduring success in an individual, must be founded upon good character.

Character, in the sense in which I am using the term, is defined as:

"The combinations of properties, qualities or peculiarities which distinguishes one person or thing, from others; and specifically the sum of the inherited and acquired ethical traits which give to a person his moral individuality."

In a sense, it may be said without inaccuracy that a group of persons who have associated themselves together as an artificial entity called a corporation, and who are engaged in a public service, have, in their corporate capacity what this definition describes as character.

It goes without saying, that as a corporation has not all the attributes of a natural person, its character will be more limited than that of a natural person, but in the essential things, such as honesty or dishonesty, fair dealing or trickery, courtesy or discourtesy, broadmindedness and an equitable disposition or a selfish and technical point of view, a public utility corporation not only may have but inevitably will acquire, a character, just as an individual does. This character of a public utility corporation will be the ultimate expression of the effect upon the utility itself of all its transactions, and will be as potent in determining the attitude of the public toward it, as is the character of the merchant or manufacturer, in determining his relations with his customers, or the character of the banker in fixing his relations with those whom he serves, or the character of the lawyer in fixing his relations with his clients, or the character of the physician in influencing his relations with his patients, or the character of the clergyman in determining his standing in the community. This character must inevitably be either a great asset, or a corresponding liability. Sound character is absolutely essential to substantial success. It must be at the foundation of all successful business. Unsound character is a handicap so heavy that no public utility can permanently carry it.

It is said that the late J. P. Morgan, when testifying before a committee of Congress shortly before his death, when asked whether security was not the basis of all credit, replied "No," that the fundamental basis of all credit is the character of the man who applies for the loan. The same idea was the foundation for the statement of a very level-headed Irishman who was at one time the president of a bank in the city in which your president resides. He said that the only poor loans he had ever made were those based on collateral; that he had never made a loss when he had loaned on the man. Good character alone will not ensure success, but good character is an essential to success.

Character, whether good or bad, and whether it be the character of a public utility or of an individual, is not an accident—it is not something that happens—it must be earned. Its nature is such that it must grow slowly and gradually. Its cost is commensurate with its value. The character of any public utility must be the outgrowth of the enormous aggregate of its individual transactions covering a series of years. What its character is will be determined by these transactions, and each of them will affect it. If they are uniformly characterized by courtesy, by honesty, by fair dealing, and if the public utility persists in this courtesy, and honesty and fair dealing, it is inevitable that these characteristics will become established and will receive public recognition. If its conduct is characterized by discourtesy, or by dishonesty, or by unfair dealing, and these persist, it is just as inevitable that these characteristics will form the basis of the public attitude toward the utility. Every time any representative of a public utility has any transations with others, the result of that transaction goes into this account. No transaction is so insignificant as to have no influence upon either the debit or the credit side. No transaction is so important that it alone may control. Single transactions may have great influence, but the ultimate result will be the balance of the accounts of all the transactions. Character is of slow growth, and as it develops it will inevitably reflect the results of the innumerable daily transactions of the person in question, whether this person be a natural one or an artificial one.

An employee who is inefficient, or disloyal or inattentive to his work, will ultimately be found out, no matter how much care and shrewdness he may exercise in an effort to conceal his shortcomings; and on the other hand, an employee who is efficient, and loyal and diligent, will just as certainly be found out, no matter how hard he may try to conceal his excellencies. In the same way, a public utility will be found out; the public will, without question, find it out. If it is in fact courteous, if it is in fact fair, if it is in fact honest, it is absolutely impossible to prevent the public from knowing this. It its courtesy, or fairness or honesty, are mere pretense, the public will know this also. Lincoln's much quoted statement is stiil true, and always will be true. "All of the pnblic may be fooled some of the time, and some of the public may be fooled all of the time, but it never has been, and never will be, possible to fool all of the public all of the time."

The fundamental essential thought is that the character of a public utility should be like that of a strong, clean, upright man, sound to the core, not on the outside merely. Short cuts and sharp practices have demonstrated that they are worse than useless

In the transactions with the customers of every utility frankness, honesty, courtesy, and fair dealing are at a premium. Energy devoted to efforts to hoodwink or outwit the public is wasted. The public utility that wishes to succeed to-day, and which wishes to make that success permanent for the future, must recognize the fact that success, to be lasting and substantial, must be merited. It must assume exactly the attitude toward the public which an upright merchant assumes towards his customers. It must sell good, honest goods, in the form of service or commodities. It must keep abreast of the times, and improve what it sells so as to keep up with the progress of the art and science upon which the service or commodity depends. It must study the needs of the community, and anticipate them instead of meeting them reluctantly and as the result of pressure. It must earn the confidence of its customers by treating them honestly and frankly. It must earn the good will of its customers by a sincere, not simulated, care for their interests. It must realize that what it is engaged in is service, and that it is a servant; and while maintaining its own dignity and self-respect, as the best of servants must do, it must recognize the fact that it must render loyal, faithful, intelligent service, if it expects to enjoy the rewards of such rervice.

I concede that what I have said presupposes a willingness on the part of the public to be fair to public utilities. I believe that this disposition exists as to the great majority of those who constitute the patrons of public utilities. Let us consider the situation for a moment. The great body of the public is not without common sense. It knows that it requires the service of the utilities, that they are more than conveniences, that they are necessities. It knows that it cannot obtain these services without paying for them, any more than it can obtain any of the other necessaries of life without paying for them. Its entire business education has supported the general proposition that to secure something good it must pay a fair price, and, speaking broadly, that what it desires to buy can only be secured by paying a profit to the seller.

Is it fair to assume that the man with this education and experience, who responds to fair dealing on the part of his grocer and his butcher and his baker, will not respond to fair dealing on the part of the person who sells him his gas, or his water or his telephone service? Is it fair to assume that this same man, who appreciates courtesy from everyone else with whom he has dealings and who repays it many times over in many different ways, will not do the same thing in the case of the public utility?

We, and our friends and associates whom we meet day in and day out, are typical of this public. We, ourselves, because of our environment, are subject to influences that tend to prejudice us in favor of public utilities, but not all of our friends are subject to these influences. No one would dare to say, and no one could honestly say, that these people, that the public as a whole, are not disposed to be honest and equitable.

I concede that what I have said carries with it the inference that such prejudice as exist against public utilities, or against some public utilities, may be due to the fact that they have not, in their course of conduct in the past, been actuated by the high ideals that should be at the basis of every great enterprise. I think that we must concede this. It will not do, if the pubiic are not our friends, to take it for granted that the fault has not been to some extent, at least, our own. Things do not just happen in this world. There is always a cause for them, and in our investigation as to the causes of such a condition, we should begin with ourselves.

I am an optimist with reference to the future of public utilities. Why? Because, if there is any soundness in what I have said, it means that while we must suffer for what we omit to do, we shall be adequately rewarded for what we do do. The way to success is as clearly defined for public utilities as it is for natural persons. The first great requisite is character. While this is an essential, it will not alone insure success. There must be added to it business efficiency. With these two elements combined, success will just as inevitably result from honest effort in the case of a public utility, as it will in the case of an individual. These tbings compel success. To concede that they do not would be to upset all our fundamental ideas as to our social and economic fabric. No utility and no natural person can have real success without earning it, and no utility and no natural person should ask for real success without being willing to pay for it by deserving it.

These are the things that make me an optimist as to the future of our public utilities. I most confidently believe that the fundamental rules which apply to all classes of business, apply to them. I most confidently believe that good management, persistent effort and good character, will insure their success, and I believe, with equal confidence, that they have learned to appreciate the importance of these factors, and are concentrating in intelligent effort to adjust their policies and transactions to them—in other words, to build up character. The ultimate success of this undertaking must rest very largely with the commercial departments of our utilities. Policies are determined by the executives, but their effectiveness is measured by the loyalty and intelligence with which they are carried out. In this matter of character building, no class of individuals is charged with greater responsibility than you who are directly and indirectly brought into personal contact with the units which in the aggregate constitute the public. The representative of the utility who comes into personal contact with the public creates the public conception of the utility, and of its character. The utility must work through the individual. The honesty, the courtesy, the consideration for the consumer, the fair dealing, loyalty and industry of the employee, when persisted in, make the character of the utility, and united with his effort, make the efficiency that puts the stamp of good management upon it.

Portland Cement.

GEORGE A. RANKIN.

Portland cement is defined as "the finely-pulverized product resulting from partial fusion of an intimate mixture of properly-proportioned argillaceous and calcareous materials." When the fine powder is mixed with water a hard, stone-like mass is formed. A mortar made with Portland cement is far superior in strength and durability to any other type of mortar used in construction, because Portland cement, which is the only cement formed by fusion of these raw materials, contains a compound known as tricalcic silicate, formed at extremely high temperatures. The value of employing high temperatures in the manufacture of cement was discovered about one hundred years ago, but only in recent years has the manufacture of cement been sufficiently developed to produce a uniform product on a large scale. Forty years ago its use was limited and it was manufactured only a small scale; at the present time its use is so widespread that in 1915 it required over 90,000,000 barrels, costing over $125,000,000, to supply the demand in this country alone. The uses for concrete are many. In general, it may be said that concrete is a substitute for stone. In some respects it is superior to stone as a building material, but under many conditions it is not as durable as the best building stone. There is reason to believe, however, that it may be possible to produce a cement which will yield a concrete of much greater durability than cement now made. Indeed, as the demand for Portland cement has increased and as the requirements of engineers have called for material of better quality, the manufacturers have improved the quality of their product by improvements in the mechanical methods of the industry, but very little is due to new ideas of how to make Portland cement, based on a knowledge of what the product really is. It seems not unreasonable to look forward to further improvement in cement, now that its constitution has been definitely ascertained.

We know that Portland cement is made up of a number of chemical compounds, one of which in itself possesses all the properties of a desirable cement. This compound, tricalcic silicate, makes up only about 35% of an average Portland cement, and it would seem that one method of increasing the strength and durability would be to increase the percentage of tricalcic silicate.

The early investigations which led to the production of cement containing tricalcic silicate, started from the desire of engineers to obtain a cement that would harden under water.

The cement industry may be said to have started in 1756 from the researches of John Smeaton, an English engineer, employed by Parliament to build a lighthouse upon a group of rocks in the English Channel. Two wooden structures had previously been built and each had experienced a comparatively short life. When Smeaton attacked the problem, he determined to build a structure that would weather the fiercest storms of the channel, and one of the greatest difficulties was the failure of ordinary lime mortar to harden under water. He undertook a series of investigations of lime mortars, the result of which was the discovery that a clayey limestone, when burned, produced a mortar which would harden better in air than ordinary lime and also harden under water. Such a clayey limestone he found in Cornwall, and he made hydraulic lime by burning this stone. This lime, when mixed with pozzolana, a pumice-like material of volcanic origin, produced a satisfactory mortar which he used in the construction of the Eddystone lighthouse. This cement of Smeaton's, while undoubtedly an excellent structural material, has never been widely used, because pozzolana is found only in a few volcanic regions.

This circumstance, that pozzolana was not found in England, led to further investigations to determine the possibility of making a satisfactory water cement without it. As a result of these investigations various processes for the manufacture of artificial Roman cements were patented. These were really hydraulic limes, similar to that prepared by Smeaton, though they were made by burning limestone containing a higher percentage of clay. It was from one of these hydraulic limes, patented in 1824 by Joseph Aspdin, an English bricklayer, that Portland cement derives its name, from its resemblance in appearance after hardening to Portland stone. This cement was made by heating together an intimate mixture of limestone and clay to a temperature sufficient to expel the carbon dioxide. The process thus described will not produce what is known as Portland cement, the temperature of burning not being sufficiently high for the formation of *the* essential constituent, tricalcic silicate. It was not long, however, before the value of burning to a temperature of incipient fusion was discovered. While the superiority of the cements made by partial fusion of the raw materials was soon recognized, the knowledge of why fusion is essential has but recently been discovered. In spite of this lack of scientific knowledge during the early stages of the development of the Portland cement industry in England, the proper proportions of limestone and clay to be used were discovered by burning various mixtures and testing the physical properties of the cements obtained.

The first scientific knowledge of the chemistry of cements resulted from various investigations carried on in France, the most important undoubtedly being those of M. Vicat, who started his work in 1812. He made an attempt to determine the relation between the quality of hydraulic lime and cement and the chemical composition of the stone whence they are derived, the nature of the chemical compounds formed during burning, and the changes that take place when the cement is mixed with water. It is true that the cements which Vicat prepared and studied are inferior and have little resemblance to present-day Portland cement; even so, the fundamental theories of cement making he advanced have not been refuted and appear as applicable to Portland cement as to Vicat's hydraulic limes and cements. The theories of cement making that we infer Vicat had in mind are: (1) that the lime contained in cement mortars should be present in chemical combination with some material other than water; (2) that this other material should be silica, preferably in a finely divided or gelatinous condition.

While Vicat, in France, was working out these theories, the English, with little or no theoretical knowledge (more by luck than otherwise), discovered a process for the production of an hydraulic cement far superior to any then produced in France. This was, from one point of view, rather unfortunate, for the reason that it yielded a cement (Portland cement) so far superior to any previously known that the idea became fixed that there is no possibility of producing a better cement. It would appear that this minimized to some extent the recognition of the value of theoretical cement investigation, since but little of value was undertaken for some time after Vicat's investigations.

At first the English, and later the German, process produced cement which was the standard of quality; to-day, however, the best Portland cement is undoubtedly made in America. This has been brought about by improvements in the mechanical appliances of the industry, which have been developed largely in this country, and which, as we now know, have gradually increased the percentage of tricalcic silicate in cement, by affording more favorable conditions for its formation.

Portland cement is ordinarily prepared by heating together a mixture of two raw materials, one largely of calcium carbonate, the other aluminum silicates. The typical materials are limestone and clay; other materials sometimes used are blast-furnace slag, with limestone. Any combination of materials containing lime, alumina and silica—the essential components—in the proper proportions, may be used.

Briefly outlined, the method commonly used in America is as follows: The limestone and clay, or their equivalents, are crushed and dried, to insure satisfactory grinding and mixing; they are then mixed in the proportions indicated by chemical analysis, ground together to very fine powder and burned. The burning is carried out in a rotary kiln, the raw material entering at one end and the cement clinker issuing at the other. These kilns are cylindrical, ranging from 60 to 150 feet in length and 5 to 8 feet in diameter, built of steel plates and lined with refractory material; they are supported in a slightly inclined position by friction rollers, and are slowly rotated. The fuel commonly used is bituminous coal, which, after being dried and powdered, is blown by compressed air into the lower end of the kiln. This arrangement insures a high temperature at the lower end of the kiln, so that the raw material passing down encounters a continually increasing temperature. The changes taking place in the progress of the material through the kiln may be divided into three stages: in the first the material is thoroughly dried, in the second all organic matter is destroyed and the carbon dioxide of the calcium carbonate expelled, while the third is the chemical reaction between the lime, alumina and silica to form the clinker. The time of passage through the kiln is about one and one-half hours, and the final temperature about 1425° C. The clinker, in the form of granules, varying in size from a pea to a large marble, is a partially fused mass; when ground to a fine powder, it constitutes the Portland cement of commerce. It is usual, however, to mix with the clinker, before it is ground, a small proportion of gypsum, to regulate the time of setting of the cement when mixed with water.

It has just been stated that Portland cement clinker is the result of chemical combination of the three oxides, lime, alumina, silica; but besides these three—which are the essential components—two others, magnesia and ferric oxide, always occur to some extent in commercial cement. The average of a large number of chemical analyses of American-made Portland cement is, according to Meade:

CaO	62.0%	Fe_2O_3	2.5%
Al_2O_3	7.5%	MgO	2.5%
SiO_2	22.0%	SO_3	1.5%

From this it is evident that more than 90% of an average Portland cement consists of the 3 oxides, CaO, Al_2O_3, SiO_2.

Ordinary chemical methods enable us to ascertain the aggregate proportion of each oxide present, but they yield us no information as to the manner in which these oxides are combined with one another—in other words, as to the substances which actually are present in the clinker and are responsible for its characteristic properties. The determination of this question is very important, for this reason: that, until we know what these substances actually are, we cannot hope to improve the quality except by cut-and-try methods.

When Portland cement is mixed with water, a hard mass is formed by chemical action between the water and the constituents of the cement. The first change undergone by the cement mortar in passing from a plastic to a solid state is called "setting," which requires not over a few hours. After the mortar has set there is a gradual increase in the strength of the mass, and the cement is said to "harden." It sometimes requires a year's time for a cement to acquire its full strength.

While there is still much to be learned as to the chemistry of the hardening of Portland cement, sufficient data on the hydration of the individual major constituents have been obtained to enable us to account for this gradual hardening and increase in strength, and to indicate the relative value of these constituents as cementing materials. When pure $3CaO.Al_2O_3$ is mixed with water an amorphous hydrated material is first formed. This material sets and hardens very rapidly. The compound $3CaO.SiO_2$, when mixed with water, also sets and hardens rather rapidly, and as in the case for $3CaO.Al_2O_3$, the setting and hardening are due to the formation of an amorphous hydrated material on the individnal grains, which are thus cemented together. The extent of the hydration or the percentage of amorphous material each grain will yield depends upon the percentage of water used and the time. With a

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Empire State Gas and Electric Association, Gas Manufacturing Section Meeting.

About forty gas engineers, from half as many plants throughout New York State, attended the second meeting of the Gas Production Committee of the Empire State Gas and Electric Association, held June 9th and 10th, in the Domestic Science rooms of the Brooklyn Borough Gas Company, Coney Island, N. Y.

These committee meetings are carried on with topical discussions instead of papers, and the atmosphere is of the informal kind, conductive to open and frank discussion; largely aided by the Chairman, in this case, as Victor von Starzenski, apparently has spent some time in the Ozark country.

Of the several topics brought up, the ones that took up most of the periods, were: "Operating with the Gas Oils Available" and "Purification Methods" and "Coke Handling."

Several properties reported that the present oils did not give results in heating value, comparable with the early supplies, the loss being as high as 20%. Higher heats seems to have proved a successful remedy in some cases and were generally conceded to be essential in any event. The value of oil heaters was quite lengthily discussed, but the plants using them numbered less than those who could not see the benefits to be derived from preheating gas oils.

The following question—"Does it help side clinker in water gas generator to inject steam at any point between grate bars and top of fire?" was answered in the negative, as the degree of clinkering is due to the character of the coal and the fusing point of the clinker.

The question of running plants on a B. T. U. basis rather than on a candle power standard was discussed at length. It was brought out that some gas oils within the last two years had depreciated 20% in candle power per gallon efficiency, though there was but a slight falling off in B. T. U. value. With the further deterioration of gas oil it will become prohibitive to make water gas on a candle power basis. Further, many companies will be driven to coal gas plants. As the fields of high grade gas coals are very well defined, companies will soon have to use a poorer grade of raw material. While it may be possible to maintain a fair heating value standard with coal gas made from such material, it will be impossible to maintain the present general candle power requirements. It therefore seems that it is absolutely essential that legislation be directed towards a moderate heating value standard and the elimination of the candle power requirements.

In discussing the depth of generator fuel bed it was the concensus of opinion that although a shallow fire gave a high make, it resulted in low candle power.

Although the rate of flow through purifiers given showed a wide range of practice it was quite generally agreed that for water gas the Crissfield formula was an excellent minimum.

The Crissfield formula is:

$$R = 20\ V$$

Where R is cubic feet water gas per hour
and V the cubic feet of oxide.

A discussion of the theory of purification brought out quite a number of interesting details, the matter of back pressure apparently having a marked influence on the contact between gas and oxide. One of the members stated that the "Notes on Purification," by Wm. Bennet, which appeared in the AMERICAN GAS LIGHT JOURNAL, of March 27, 1916, covered the subject in a clearer way than anything that had come to his attention for some time.

One of the plants reported that they had sold their spent oxide, which contained 6.8% of Prussian Blue for over 50% more than the cost of new oxide.

Breeze was the principal feature of coke handling brought up.

It was thought that grab buckets and belt conveyors were the best means of handling coke in the plant to prevent excessive breeze through breakage or abrasion. It was reported that one plant is selling breeze to a manufacturer who is making coffins of it.

Second Get-Together Dinner of the Pacific Coast Gas Association.

The Pacific Coast Gas Association held its second get-together dinner of the present season at Los Angeles, May 20th. It will be remembered tbat the first of these dinners, under the up-to-date policy of development inaugurated by President Frank A. Cressey, Jr., was in San Francisco in February, and was voted a most succesful experimeut.

The place chosen for this Southern California gathering was the Los Angeles Athletic Club, an institute famed for its cuisine. The gymnasium was requisitioned for the purpose and accommodated comfortably the 125 diners, not forgetting the orchestra and special entertainment features.

President Cressey was in the chair, and this time Vice-President C. B. Babcock, whose genial presence was missing from the San Francisco gathering, was on hand. As was only natural to expect, the greater number of those present hailed from south of Tehachapi; but the north made a creditable showing. "Pacific Service" was represented by Messrs. Lee H. Newbert, Leon B. Jones, Van E. Britton, F. S. Myrtle and M. L. Neely. Unfortunately, Mr. John A. Britton found it impossible to attend, and another notable absentee was Mr. E. C. Jones. We also missed the smiling countenance of the Association's able and energetic secretary, Henry Bostwick, who was attending the N. E. L. A. convention in Chicago, and incidentally enjoyed his first glimpse of the effete East. In his absence, Lee Newbert presented the Secretary's report and read telegrams of congratulations from various members who, while not present in the flesh, were very much there in spirit. A joint dispatch from Henry Bostwick, John D. Kuster and John H. Hunt sent best wishes from Broadway. Mr. John A. Britton sent a telegram, and so did E. C. Jones. "Jack" Heryford and "Rundy" Basford were heard from in Chicago, and Sam Bratton sent a message from Portland; John Clements, our veteran experienced editor, wired trom Oakland. Most interesting of all, perhaps, was a letter from England, in which Mr. Walter King, editor of the London "Journal," told of Harry L. Strange, who had left his position as manager of the gas company in Honolulu to bear arms under the British flag. Harry Strange has endeared himself to all members of the P. C. G. A., and the story of his patriotic devotion touched the hearts of all who heard.

There was loud cheering when Vice-President Babcock announced that the Association had enrolled 71 new members at its last convention. "We'll make it a hundred by Santa Barbara," said Mr. Babcock, with conviction born of enthusiasm. He reminded his hearers that the Association had been the pioneer in the establishment of a gas engineering course at the University, and in many other ways had done more than its share toward the development and advancement of the industry.

There were several other speakers. No gathering of the P. C. G. A. would be complete without Wm. Baurhyte, who took this opportunity to congratulate the city of Los Angeles on being the home of the Los Angeles Gas and Electric Corporation. Mr. R. H. Sterling, of Santa Barbara, told of the arrangement already in progress to give our members a hearty welcome in September. Mr. F. S. Myrtle, as the Chairman of the Publicity Committee, spoke on "Pacific Coast Gas Association—Make it Known." Mr. N. L. Morse, of the Southern California Gas Company, spoke words of cheer, as did also R. H. Ballard, of the Southern California Edison Company.

President Cressey announced the appointment of the following as a special committee of arrangements for the coming convention: Messrs. R. H. Sterling, Chairman; N. L. Morse, D. J. Young, Champ S. Vance and F. S. Wade.

Concerning the more material features of the evening it may be recorded that the dinner, as a feast, was unexceptionable. The entertainment features, also, proved that Los Angeles is determined that her northern rival shall not carry away all the terpsichorean honors. Beauty of form and witchery of grace were much in evidence, with sweet song to charm the ear.

And now the Pacific Coast Gas Association will rest on its oars until Santa Barbara. Members are particularly requested not to forget the date, September 19th to 22nd inclusive.

New York Section, I. E. S.

Rain did not keep down the attendance at the final session of the season of the New York Section Illuminating Engineering Society, held on the evening of June 8th, at the auditorium of the United Electric Light and Power Company, 187th street and Broadway, New York City.

Through the courtesy of the Company an informal "Dollar" dinner was served to the 150 members and guests prior to the business session. Chairman D. M. Moore introduced Mr. W. T. Dempsey in charge of Street Lighting Construction and Maintenance for the New York Edison Company, who talked on New York Electric Street Lighting, outlining briefly the development of public lighting from the early gas lamps of 1823 down to the present. Both electric arc lamps and mantle gas lamps have practically disappeared from the Borough of Manhattan, having been displaced by Type "C" units. Slides were shown giving the day and night appearance of the units, and then came one of the most interesting applications of the "Movie" art to our business. Moving pictures, showing the complete installing of posts, as well as the maintenance of the system, gave a much clearer conception of these operations than would have been possible by ordinary means.

The discussion could hardly be called such, as the schedule did not leave sufficient time. Among those who spoke briefly were: Messrs. D. F. Atkins, chief engineer Light and Power City of New York; C. A. Halvorsen, General Electric Company, Lynn, Mass.; W. A. Durgin, Chicago, Ill.; W. T. Crampton, Philadelphia; A. G. Sawin, Newark, N. J., and P. S. Millar, New York.

Immediately following the lecture all present entrained in the 40 waiting autos and were driven over a route of about 15 miles, where practically every type of lighting referred to in the paper could be seen in use. It was unfortunate that rain marred what was otherwise a valuable as well as an interesting meeting. Mr. W. F. Little, Chairman of the Paper Committee, is to be congratulated on his work, as the attendance at the season's gatherings made a new record.

Illuminating Engineering Society Council Meeting.

A meeting of the Council of the Illuminating Engineering Society was held June 8th, in the general offices of the Society, 29 West 39th street, New York city. Those present were: Chas. O. Bond, H. Calvert, Wm. A. Durgin, C. A. B. Halvorsen, Geo. A. Hoadley, Clarence L. Law, C. A. Littlefield, general secretary, Preston S. Millar, A. S. McAllister; and by invitation, C. E. Clewell and Geo. H. Stickney.

Reports were received from the chairman of the various standing and special committees and from the representatives of the various sections of the Society. A special report was received from the committee in charge of the annual convention and the lecture course that is to be given at the University of Pennsylvania in the fall.

The annual election to fill the general offices for the succeeding fiscal year of the Society, resulted as follows: Wm. J. Serrill, president; M. G. Lloyd, vice-president, representing Chicago Section; T. H. Piser, vice-president, representing New England Section; Geo. S. Crampton, vice-president, representing Philadelphia Section; C. E. Clewell, general secretary; L. B. Marks, treasurer, and directors C. A. Luther, D. McFarlan Moore and P. G. Nutting.

(*Continued from page 391.*)

Portland Cement.

given percentage of water the amount of amorphous material formed from the $3CaO.Al_2O_3$ in a given time is much greater than for the $3CaO.SiO_2$; that is, the compound $3CaO.Al_2O_3$ reacts with water much more rapidly than the $3CaO.SiO_2$. The compound $2CaO.SiO_2$ reacts very slowly with water, and it is only after a long period of time that sufficient amorphous hydrated material is formed to cement together the grains of this compound and form a hard mass.

The amorphous hydrated material formed by the action of water on the constituents of cement does in time, no doubt, crystallize to some extent. From the data available it would appear that the crystals formed are calcium hydrate and some crystalline hydrate derived from $3CAO.Al_2O_3$. Apparently no crystalline hydrate of the calcium silicates is formed.

From this brief description of the action of water on the constituent of Portland cement it will be seen that the setting and hardening of Portland cement involve the formation of an amorphous hydrated material which subsequently partially crystallizes; that the initial set is probably due to the hydration of $3CaO.Al_2O_3$; that the hardness and cohesive strength at first are due to the cementing action of the amorphous material produced by the hydration of this aluminate and of the $3CaO.SiO_2$; and that the gradual increase in strength is due to further hydration of these two compounds, together with the hydration of the $2CaO.SiO_2$.

Of the three compounds which thus take part in the setting and hardening of Portland cement, the $3CaO.SiO_2$ appears the best cementing constituent; that is, this compound is the only one of the three which when mixed with water will set and harden within a reasonable time. The compound $2CaO.SiO_2$ requires too long a time to set and harden in order to be in itself a valuable cementing material. The compound $3CaO.Al_2O_3$, while it sets and hardens rapidly, is rather soluble in water and is not particularly durable or strong.

From this it would appear that the compound tricalcic siliciate is *the* essential constituent ef Portland cement; consequently, the higher its percentage the better the cement.—*From paper read before the Section of Physics and Chemistry of the Franklin Institute.*

A Review of American Gas Institute Committee Work on Distribution Subjects.

G. I. Vincent, Des Moines, Ia.

It may be interesting to state first the origin of this paper and its odd title. At the meeting of the program committee of the Iowa District Gas Association, the writer, who was engaged at that time on some work on one of the Institute Committees, had occasion to refer to the matter and asked the members of the program committee for suggestions on the work which was under way. This led to some discussion, and the members of this committee felt that the members of the Iowa District Gas Association might be interested in knowing just what was being attempted in this work.

For some time the Institute has been endeavoring to standardize the work of the gas industry. This idea originated with the work of the committee on Cast Iron Pipe and Specials, completed some time ago, and all gas companies, as well as all the foundries who supply cast iron pipe and specials, now have those standards. The idea of going further with standardization originated, I believe, with Mr. Walton Forstall, of Philadelphia. At first the work consisted largely of papers on street main installations, street main standards, service installation, etc., as well as a number covering the manufacturing end of the industry. These papers led to the idea that if standardization were to be accomplished it must be done by committee work. Papers largely represent the ideas of the individual writing the paper, even if he collects a great deal of data on his subject. It was thought that committees would have not only the joint idea of its members but also data from all gas companies, and that at least a step in the direction of ultimate standardization would be accomplished.

In 1914 a number of new committees were appointed, among them one on meter connections, on house-piping, and on cast iron pipe joints. With the work of these three committees the writer is familiar, and will endeavor to explain what has been accomplished to date and what it is hoped will ultimately be accomplished.

At the Institute meeting in San Francisco, no reports were read, nor was there any discussion. The reports were read by title and ordered printed in the proceedings.

Committee on Cast Iron Pipe Joints.

The idea of this committee was to standardize the making of cast iron pipe joints. Incredible as it may seem, methods of making cast iron pipe joints vary widely throughout the country. The committee collected data from all the large gas companies, summarized it, added a few of their own ideas, and presented a report at the San Francisco meeting. As stated, there was no discussion at that meeting, as the committee felt that the only possible way to arrive at conclusive specifications in reasonable time was to secure discusion, it was suggested that the preliminary report of the committee be printed in the "Gas Institute News," and discussion asked for. This program was carried out and resulted in considerable discussion; more than was hoped for, but not by any means enough.

Summing up the matter briefly, the committee found that cast iron pipe joints were being made with cast lead, with lead wool, with cement, and with combinations of lead and cement. A few patented joints are being used but the percentage is so small as to have no bearing on the subject. The concensus of opinion seems to be that cement may be used for main joints for low pressure, although a number of the larger companies are still using lead joints. Most companies do not use cement for large mains. The term "large mains" is rather flexible, some engineers giving 12″ or even 10″ for large mains while others put the limit at 20″. It is an interesting fact, however, that some companies, in climates about as bad as any in the country, use cement joints for large mains with entire satisfaction, At least one company is using cement joints for small mains with pressures as high as 15 lbs. This is certainly a rigid test because this company operates in a fairly thickly settled suburban district.

The preliminary report of the committee recommended the use of cement joints in mains up to 8″ under all normal conditions; suggested that for mains 10″ and over cement should not be used in standard bells, but left the matter open as to whether it was possible to design a bell in which cement could be used satisfactorily on large mains.

The most interesting discussion was that by Mr. D. B. Evans of Philadelphia, dealing with experiments made by the United Gas Improvement Company on large main joints; which seemed to indicate that the cement joints in standard bells in large mains is a hopeless proposition, but as has been previously stated, the fact that they are being used in work under difficult climatic conditions, offsets the results of these laboratory tests. The large experimental cement joints failed under test very much below the calculated strength, but in the absence of specific data the committee is inclined not to draw conclusions from the laboratory work.

After the report was published the committee again wrote to a number of the large companies, asking for discussion and any data they had. Considerable data of value was secured, but not all of the discusion was satisfactory. There seems to be in some few cases a lack of appreciation of the work that is being undertaken by our National technical body. One example might serve to illustrate this point. In the preliminary report of the committee in the specifications for making cement joints, some new tools were described and illustrated. One of the discussions was to the effect that they did not see any necessity for making tools, because they had never used them. The writer respectfully submits that discussion of this kind is valueless.

Up to this writing the committee has found very little to change in its specification for cement joints. It has found, however, that

with the data at hand, there is not any possibility of standardizing the joints for large mains, although it has not completely given up the idea of cement joints for large mains. Further experimental work is under way and may lead to interesting results. One of the experiments of especial interest was undertaken to determine the actual strength of the bond and the shearing strength of the cement in the joints. If the specifications are followed, the joint will be filled with cement from a point back of the head on the spigot to a point in front of the lead ring in the bell. The strength of such a joint lies in the bond between the cement and the iron, plus the shearing strength of the cement across the lead ring. Heretofore, in theoretical calculations for cement joints, the figures adopted by engineers are those used in reinforced concrete construction for bonds and shear, and the results of the experiments so far indicate that these figures are too low. Even if it is found that these figures are approximately correct, and can be depended upon, it would seem possible to design a large cement joint of equivalent strength to the small joint. If the committee accomplishes nothing else, but finds it possible to make large cement joints, certainly their work will not have been wasted. It is obvious that the much lower cost of the large cement joint would appeal to the gas industry, and there is no question but that a rigid joint in cast iron mains, if permanently tight, will be more satisfactory than any form of flexible joint. Any form of joint made with lead wool or lead is, in a sense, a flexible joint, and would be expected to ultimately leak, although it might remain tight for years. One other advantage pointed out in the preliminary report of the committee is of interest. A line laid with cement joints has very high electrical resistance, and would probably be more immune against electrolysis than a main laid with joints that are conductors.

As stated before, lead wool for large mains has come into extensive use during the last two or three years. A number of engineers have adopted it and believe it satisfactory. They are, however, expensive, and there has been at least one interesting negative report. In a large main of some length laid with the utmost care, two of the joints failed by pulling due to contraction of the main. The conditions seemed to indicate that the strain concentrated at these two joints instead of being distributed over all the joints. No concluson should be drawn from this one instance, but it seems to controvert the theory that in a main laid with any type of flexible joint the strains are distributed and affect each joint, the effect being so minute, that the joints are not made to leak by the slight movement that occurs.

The committee expects to present a further report at the Institute meeting in Chicago in October.

Committee on Meter Connections.

In the design of meter connections there is probably as wide a variation as in any installation work. This committee was appointed with the idea of standardizing meter connections, and collected a great deal of data from large gas companies and submitted a preliminary report, which was read by title in San Francisco, but up to this time has not been published. The writer has read the preliminary report, and it is a very valuable addition to the literature of the subject, although it did not come to any definite conclusions. The report described a number of connections and apparently favored, although not by name, one of the proprietary meter connections now on the market. There would seem to be no objection to recommending a proprietary article and calling it by name, if the particular article were the final word in the matter under discussion. It was pointed out, however, that the particular connection described in the preliminary report was not by any means the last word on the subject. It seems capable of very considerable improvement, although it has been adopted by a number of gas companies.

It certainly seems possible to design a meter connection that would be satisfactory under all conditions. It is also a pity that this design was not forthcoming before the several proprietary connections were not on the market which, as above stated, do not seem to be completely satisfactory. As far as the writer is aware none of these connections or any others in use by various gas companies are entirely satisfactory. It is interesting to note that one large gas company uses a connection of its own design, which in the opinion of the committee is not at all suitable for general adoption. Whether this committee will continue and ultimately present to the Institute some stardard form of meter connection has not been decided. In the opinion of the writer it would be one of the most valuable things done in association work, if this result could be accomplished.

This committee was continued from 1915 to 1916, their work amplified in that they take in not only meter connections but meters as well, and their report will probably cover the whole subject of handling meters. It is hoped, however, that the subject will be again divided, and that ultimately a standard connection will be designed and submitted, and also standard methods for the handling of meters.

Committee on Gas Housepiping.

At the 1914 meeting of the Institute, Mr. Turner of New York read a paper on housepiping. As an outgrowth of this paper a committee was appointed and worked through 1915, and reported at the San Francisco meeting. This committee collected data from practically every gas company in the country that had any rules for housepiping. The rules were carefully considered by the committee and a set formulated which it was believed fully covered the requirements, and could be applied to every gas company, regardless of size or geographical situation.

Up to this time this report has not been published, but copies were sent to a number of companies and discussion asked. As with the pipe joint committee work, much of this discussion was valuable and useful, but some of it decidedly lacked the spirit of co-operation. For example, one company criticised the report in that they did not see that it was any better than the rules they were themselves using. The writer is familiar with the rules formulated by the committee, and with those used by this particular company, and has no hesitancy in saying that the committee's rules are superior. The writer would not for a moment offer this as characeristic of the companies in this country, but if even a small minority took this attitude, how far could we get in standardizing our work?

Very unfortunately, just as the report was ready to be arranged in final form for presentation to the Institute, the chairman of the committee, Mr. C. E. Reinicker, resigned, as he was leaving the employ of the Peoples' Company in Chicago to take the position of assistant gas engineer of the Bureau of Standards. The chairmanship was turned over to one of the other members of the committee, and the report has now reached final form, and been submitted to the chairman of the Technical Committee. It was fortunate, perhaps, that the succeeding chairman had an opportunity to go to Washington and go over the details of the report with Mr. Reinicker. The report, as finally submitted, represents very few changes from the original draft.

It consists of a series of rules, a table of pipe sizes and lengths, and explanatory notes. The rules are not elaborate, although probably considerable more so than those used by most companies, but not by any means as elaborate as those used by several of the larger companies. Another thought the committee had in mind was to formulate the rules so that only minor changes would be required if adopted in any situation. One of the rules will illustrate this point. It is customary in rules for housepiping in many of the larger companies to give a list of specific locations in which the setting of meters is prohibited. These prohibitions was cut out of the final report and the rule made general, to the effect that the gas company reserved the right to select the location for the meter in all cases. The committee kept in mind that the rules were for plumbers and gas fitters; and while all the rules are mandatory, where any exceptions are possible, the final decision is left to the gas company. In the table of sizes, rather larger sizes were used than obtained in most locations. The sizes used were not excessive, but the committee had in mind that the use of gas in larger quantities was increasing, and therefore houses should be piped to allow liberal supplies at any location in the building.

If after these committee reports are adopted by the Institute they are simply buried in the records and forgotten, nothing will have been accomplished. From the gas companies throughout the country two things are earnestly needed: First, co-operation in the preparation of the reports. Second, an adoption of the practice as outlined in the reports completed.

The writer takes this opportunity to appeal to the members of this, the oldest and best of the State Associations, in asking for this co-operation. Read the reports, criticise them frankly and completely. Criticise them constructively, if possible, but any way criticise them. Then, after the reports have been adopted and the practice accepted as standard, use as much of the practice as you can in your work. Is it not obvious, that a standard practice representing the best thoughts of the large majority of gas companies in the country will, if adopted, lead to economy in installation? This applies to the very smallest as well as the largest company. Whether you are setting 10 or 10,000 meters a year, or piping 1 or 100 houses, or laying 1 mile or 100 miles of main, if there is one best way to do the work, should not that be the way you should use?—*From paper prepared for the Iowa District Gas Association.*

Cost of Utility Changes Made to Avoid Interferences.

Gas, water, traction and electric companies stand in the position of joint tenants with regard to municipalities, in their use of the public streets for locating their mainline plants. Each company's relation to the municipality is defined by franchise and ordinance, but there is seldom any clearly defied basis, other than the desire to be fair, to control the cases of plant interference between the companies. The determintion of the correct method of estimating the just cost to be charged by an owner when he rearranges his plant to accommodate another company is the subject of this discussion.

It will be assumed that a company building a new plant or an extension of its existing plant, recoguizes its reponsibility not to jeopardize the existing plant of others, and not to put others to any expense as the result of its additional occupation of the street. In short, the existing plants, by virtue of priority, have the right to remain undisturbed; and if they are disturbed, the newcomer must bear the burden incurred because of his work.

Different conditions governing the work necessary where the existing plant of one company must be changed or rearranged to accommodate the newcomer, may be classified as follows:

A. The existing plant may be shifted without involving the replacement of plant units.

B. Plant units are replaced with units of (a) the same capacity, (b) different capacity.

Units are of the same capacity when they are equally serviceable, have the same potential use and the same life. For example: Two lead-covered cables having the same number and gage of copper wires similarly insulated are of the same capacity even if they differ in their physical type, but any variation in any of the essentials which varies the potential use of the cable creates a difference in capacity. Difference in type must not be confused with difference in capacity, for if there is no change in capacity, the difference in type is of no moment. This will be appreciated when it is remembered that there is no difference in value between two units of the same capacity, but of different types, because one has the same service capacity as the other, hence the same merchandise value. The market value of the now used type determines the value of both types, and the older type appreciates or depreciates from its original cost (and original value) to the value of the now used type. This greatly simplifies the valuation of units of different first cost but of the same capacity, as current prices always measure the value of the unit.

Considering then the conditions under which work is done, as previously mentioned, if we determine the theoretically proper practice to be followed in each case, we can arrive at a working practice to fit each condition. Following the classifications above outlined:

A. Here there is no question of any benefit accruing to the owner; and the other company must bear the entire cost of the change that is made for its accommodation. The gross cost will include all miscellaneous material, labor and incidentals, together with the owner's overhead or supervisory charges on such labor as is furnished by him. The net charges will be the gross cost less the value of any material recovered by the owner.

B. (a) The necessity for replacing one unit with another of the same capacity may be because of the inability to do the job in any other way, or because it is more economical than to change the existing unit. Both conditions permit the same analysis.

The question of a betterment to the owner because of replacement of a partly worn-out unit by a new unit, is thus introduced, and in practice there is always the further question whether this theoretical betterment will be realized by the owner. If the betterment is not realized, it is of no value to the owner. There can be no question that the miscellaneous material, labor, incidentals and overhead are charges to the second company, and the recovery of miscellaneous material is credited as in A.

It is theoretically correct to charge the net cost of the new unit to the second company (the net cost obtained by subtracting from the present cost the present worth of the value of the unit when it is retired from plant), the recovered old unit being kept by the owner without crediting the recovery value, if any, against the cost of the job. In other words, the second company pays the net cost to the owner of the new unit, and delivers the owner's original property, the old unit, to him.

In practice, it is difficult to determine the present worth of the future recovery value of the new unit, because both the time when the new unit will be removed and its recovery value at that time must be estimated. The owner must use his best judgment, based on experience, to determine this value. Instead of trying to determine this figure, the recovery value of the old unit is frequently credited to the second company, and the full cost of the new unit charged them. This is a simple adjustment, and generally a liberal one, as the recovery value is credited at full value instead of on a present-worth basis.

It must he remembered that this is a practical modificaton and not a fundamentally correct practice. It would lead to errors if applied to the next class of conditions.

(b) A change in capacity of units replaced may be for one of the following reasons:

1. A larger unit is used, because the owner desires to provide additional capacity. The owner should bear the entire extra cost of the work due to the change in capacity, as the increase is for his benefit; and the job should be charged to the second company, as if similar-capacity units had been used, and the credits adjusted on this basis.

2. A smaller unit may be used, because the owner no longer needs to retain the full capacity of his plant. It is evident that the fundamental principle, given in B (a), must be applied, and that the approximation of crediting the plant recovered to the job, and charging out the new unit at full price is not correct. In extreme cases the value of the recovered units might even exceed the entire cost of the work, putting the owner in the position of paying the other company for a rearrangement of the plant made for the benefit of the second company. The recovered units must go to the owner, and the estimatefi net cost of the new unit must be charged to the second company.

3. One large unit is used instead of restoring two or more smaller units, as an economy for the benefit of the second company. This again emphasizes the necessity of applying the fundamental principle in B (a) and avoiding the error of crediting the value of the recovered units against the cost of the job.

4. An obsolete unit is replaced with an approved type of as nearly the same capacity as can be obtained. Here there is no betterment to the owner, unless the obsolete type is defective, in which case the owner should replace it at his own expense. When the obsolete type is not defective, the case should be handled as in B (a).

It is seen that the one consistent principle that can be followed in all cases regarding the replacement of units; is that of B (a), namely: Charge the job with the net cost of the new units not to exceed the capacity of the existing units, and make no credits for recovery value of units removed. Because of the ease of confusion in handling the material credits, careful attention must be given each case.

By basing each case upon the fundamentals herein given, we believe a much clearer understanding will be reached by all who have to handle such matters.—*N. N. Shearet, in "Engineering News."*

Publications.

Buyers' Index.—The N. C. G. A. index of gas appliances, which is part of their "Hand Book," requires enough pages to warrant a change of title to a "Shelf Book." Buyers will not complain of lack of material, but if they write to all listed the stamp account will jump without a corresponding increase in efficiency of effort. The company members who have been so active and generous in making the Association valuable will have little solace from the method of arrangement, as they are not given the preference they deserve. A simple star after each such name might indicate that a company in sympathy with the aims of the fraternity made the appliance listed. Some of the manufacturers included should have a copy of the first rule of our National Safety Code, "Don't Blow Out the Gas."

Washington, D. C., in the Lime-Light.—"Printers Ink," recently published an illuminating article on the depth of the average advertising expert, citing the efforts of the Washington, D. C., Gas Company as an effective innovation in selling, as they use the installment plan. We know that advertising pays but the gas man will hardly be convinced by a description of Washington conditions, which gives installment methods the credit for big sales. The method is nearly as old as gas appliances.

Energy.—This suggestive title of the new bulletin of the New Orleans Railway and Light Company, has all of the merit the pschycologist looks for in a name. The company has energy for sale, and it requires that qualification to market the product. It is, however, poorly printed and edited, and the mistake of selling advertising space has been incorporated in its plan.

Edison Current Topics.—Any gas company contemplating the issuance of a monthly publication should see a copy of the one issued by the Southern California Edison Company, Los Angeles, Cal. It tells a story that should be of interest to the consumer as well as the employee, and your employees are better prospects than many of us realize.

Concrete Tests.—Tests to determine the action of concrete and reinforcing steel in floors of the slab type of building construction have been made by the Engineering Experiment Station of the University of Illinois on the Shredded Wheat Factory at Niagara Falls, N. Y, the Soo Line Freight Terminal at Chicago, the Schulze Baking Company Building at Chicago, the Curtis-Leger Company Building at Chicago, and a special test structure at Worcester, Mass.

The methods employed and the results are given in Bulletin No. 84, by Professor A. N. Talbot and W. A. Slater. The data obtained have been analyzed, with the result that many new facts of interest and importance to designers and builders of concrete flat slabs structure have been developed.

Oil Filters.—Bulletin N. 5, of the Richardson-Phenix Company, describes a line of filters for purifying lubricating oil, having capacities of from 25 gallons per day to 50,000 gallons per hour. The catalog indicates the advance made in recent years in oil filtration and shows how scientific principles are employed in the small as well as the large size filters.

The large filters are made of heavy steel plate, the oil connections into some of them being for 10″ pipe.

Advertising Campaign.—A good-will campaign was carried on in the Philadelphia newspapers by the United Gas Improvement Co. during the past winter, which was thought valuable enough to make available to others. The broad spirit of the organization is again demonstrated, as managers of other companies can have a copy of the ads used for the asking. It is called Quick Service, and from the material, make-up, etc., we know that it brought results.

Baume Scales.—The Bureau of Standards (Circular No. 59) entitled "United States Baume Hydrometer Scales," now available for distribution, was prepared for the purpose of clearing up certain erroneous ideas in regard to the origin of the Baume scales in use in the United States.

Special attention is devoted to the Baume scale for liquids lighter than water; and reasons are given to show why the scale based on the modulus 140 should be used to the exclusion of all others.

New Methods and Appliances.

Welded Gas Mains Under Brazos River.

The laying of two 10″ gas mains under the Brazos River at Waco, Tex., is of unusual interest because of the long lengths of welded pipe dropped into place, the depth of trench required to prevent washing out of the lines, and the precautions necessary to prevent rapid rises of the river wrecking the work while under way. Twelve electric cables were laid in the same trench with the pipe.

The river bottom was of rock under 8 to 10 feet of coarse sand and gravel, and over the latter about 12 feet of alternate layers of quicksand, clay and fine sharp sand; and the trench was carried down to gravel clear across the river. Substantial falsework was erected to carry a traveling combined piledriver and derrick. Wakefield sheetpiling was driven on the upstream side of the trench and braced to the falsework.

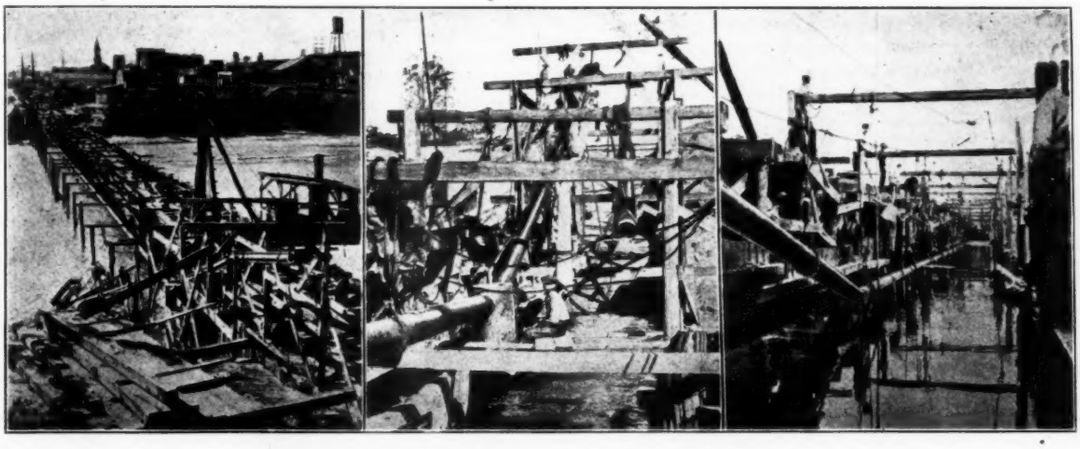
The 20-foot lengths of pipe (3/8″ wall and 10″ diameter) were welded up into 100-foot lengths in the approach ditch on the west side of the river, and at about the level of the top of the falsework. Beveled-end pipe had not been ordered, and a butt-weld was necessary, so the pipes were set 3/8″ apart and the space filled with Norway iron. About 45 minutes was required to weld each joint, compared with 30 minutes for work where beveled ends have been used. The joints were first tested by bending, placing a block underneath and a man on each end; then they were put under 90-pounds internal pressure.

After the 100-foot lengths of the subaqueous section (550 feet in all) of the first line were completed, they were pulled out over the river on the falsework for the final welds, the welder followed by a man coating the pipe with asphalt. Then burlap strips were wound on and coated with asphalt, and a second layer of burlap and coat of asphalt were added.

Cast-iron drip pockets were ordered, but they proved to be porous, so others were made of boiler-plate sheets welded-up on the ground. The drips were 24″ diameter and 5½ feet high.

The 550″ line was lowered by block and tackle until it floated on the water inside the falsework. Then the pipe was loaded with 115 pounds of steel sheetpiling on each 20-foot section to sink it into place. This procedure was repeated for the second main, and the electric cables then pulled across.

The total cost of the welding was about $650, including the services of one skilled welded for 38 days at $5.60 per day, 3,600 feet of oxygen and 3,400 cubic feet of acetylene—both at 2 cents per cubic feet. The work was done under contract by a New York company.



Putting a 10-inch Gas Main under the Brazos River at Waco, Tex.

Fig. 1—General view of falsework. Fig. 2.—Drip pot at shore end of first line; pipe ready to drop. Fig. 3.—Line floating.

Items of Interest from Various Localities.

THE Northern New York Utilities, Inc., Watertown N. Y., has announced a readiness-to-serve charge of 50 cents a month to all consumers of gas, effective on July 1. In putting the rule into effect, the company has sent out notices to all gas consumers, containing the following explanation:

"The interest and depreciation on the investment in service pipe, meter, etc., together with cost of maintenance, meter readings and office expense, is in excess of 50 cents per month, so that the charge for readiness-to-serve is entirely reasonable, and such a charge is being made and has been made in the past by companies furnishing gas service in other cities."

THE Boston Consolidated Gas Company has asked the Massachusetts Gas and Electric Light Commission to approve their proposal for supplying gas to the Citizens Gas Company, Quincy, Mass.

THE Queens Borough (N. Y.) Gas and Electric Company has bought a plot of ground, 100 x 338 feet, on Franklin avenue, at Hewlett Station, L. I. The use to which it will be put has not been made public.

THE British Board of Trade has issued a circular to English gas undertakings requesting them to ask consumers to reduce the use of gas for lighting by 10%, in order to reduce the quantity of coal used for making gas. At the same time the Ministry of Munitions asks every one to use gas for all purposes, in order to increase the production of benzol and tuluol. Just a difference in point of view.

THE Massachusetts Gas and Electric Light Commissioners' annual report for 1915, just issued, discloses the fact that the per capita use of gas in Massachusetts for the year showed a decrease from that in 1914. The total production of gas of all kinds amounted to 15,786,630,000 cubic feet in 1915, while in 1914 it was 15,536,223,500 cubic feet, a gain of only 1.7% in actual output, while the population of the State increased about 2.5%.

IT is reported that natural gas from Louisiana may be piped to Houston, Texas. Just at present there is a surplus of gas in the Bossier Parish fields, near Shreveport, and Chicago interests are willing to finance a line to southeast Texas.

THE city of Baltimore and the officials of the Columbia Gas and Electric Company are still deadlocked over the details of the contract to supply Baltimore with natural gas from West Virginia. The city officials stand firmly by their decision to charge a franchise tax of 4% on the gross receipts of the company from all gas sold in Baltimore, and the company wants 2% and to charge 50 cents a thousand for the first 4,000 feet of gas monthly for domestic consumption. Columbia Gas and Electric, through its subsidiary, the Baltimore Natural Gas Company, has secured control of the charter granted in 1904 to the Tube Delivery and Dispatch Company under which the right of eminent domain may be exercised, and this charter has been amended so that the company has the right to transport, sell and deliver natural gas in any part of Maryland.

AS an index to the rapid growth of San Antonio, Tex., the construction of another large gas holder will be commenced by the San Antonio Gas and Electric Company, at Durango and South Salado streets, in the near future. The two lots to be utilized for this purpose were purchased from the Pierce-Fordyce Oil Association.

CHARTERS have been filed in Dover, Del., by the Southern Counties Gas Securities Company to produce and distribute artificial gas, capital $9,000,000; and by the Dubuque Electric Company, capital $4,000,000. Chicago interests are connected with both companies.

THE price of gas in Pawtucket, Manville and Woonsocket, R. I. will be reduced 5 cents per 1,000 cubic feet, effective July 1. New tariffs, making this reduction, were filed recently with the Public Utilities Commission. The Pawtucket Gas Company will cut the rate from $1.15, less 10 cents discount, to $1.10, with the 10-cent discount applying in Pawtucket. In Manville it has a rate of $1.30, which is to be reduced to $1.25, with the 10-cent discount. The Blackstone Valley Gas and Electric Company, at the same time, makes a cut from $1.25, less 10 cents per 1,000 cubic feet, to $1.20, with the same discount, for Woonsocket.

IN the development of new east side residential streets, the Des Moines (Ia.) Gas Company, this summer, has put in mains as follows: East Fourteenth, from East Grand to 156 feet north; East Twenty-second street court, from Maple to 800 feet north; Boyd, from East Ninth to 69 feet west of East Thirteenth street; State, from 170 feet west of East Twenty-third to Searle; Searle, from State to 244 feet north; East Eighth, from Ovid to 125 feet north; Stewart, from Garfield to 720 feet north; Des Moines, from 112 feet east of East Twenty-sixth to 75 feet east of Twenty-seventh; East Twenty-seventh, from Des Moines to 144 feet south; Guthrie, from 14 feet west of East Fifteenth to 475 feet east of East Fifteenth; Des Moines, from 59 feet west of railroad to 100 feet west of East Twenty-first; Grand View, from 56 feet west of East Fourteenth to East Fourteenth; East Fourteenth, from 96 feet north of Grand View to 200 feet south of Grand View; East Eleventh, from Arthur to 250 feet south.

ALANSON P. LATHROP was elected President of the Binghamton N. Y., Gas Company, at the annual meeting of the company. Jas. W. Manier was elected vice-president; E. H. Kifer, secretary and general manager, and R. W. Manier, treasurer. The directors are Emerson McMillan, Alanson P. Lathrop, Israel T. Deyo, S. J. Hirschmann, James W. Manier, George F. O'Neil, William G. Phelps, Charles M. Stone and E. H. Kifer.

THE Rockville-Willimantic (Conn.) Lighting Company has leased both stores in the Kimbel block, that is, the store now occupied by them for their office and also the one adjoining, and will commence at once to remodel the interior and put in a new front. They state that more room is required for their office, and by taking both stores they will have a large show window and more room for display. The change will make a big improvement on Main street, as they intend to have a very attractive show window. There will be one entrance to the office and archways will be cut through the partitions which now separate the two stores.

MICHAEL GALLAGHER of Bangor, Me., has been retired on a pension after 50 years of faithful service with the Bangor Gas Light Company. He went to work with his father, James Gallagher, for the company in the winter of 1862-63, and after serving in the United States navy during the Civil War, was honorably discharged and returned to Bangor to again enter the employment of the company under his father, who was the first Bangor man to work there. For thirty years he was employed as fireman, holding that position longer than any other man. He was then promoted to yard boss. Mr. Gallagher is to-day a well-preserved man of 70 who does not by any means look his age. Through the kindness of General Manager Curtis and Superintendent Merchant he was retired on a suitable pension bearing with him the best wishes of all his friends.

THE Pacific Gas and Electric Company has issued the following statement of consumers by departments and by years ended April 30:

	Gas.	Electric.	Water.	Steam.	Total.
1907	106,795	45,535	5,311	...	157,641
1908	123,794	56,197	5,638	...	185,629
1909	131,409	63,889	5,875	...	201,173
1910	141,688	73,260	6,489	...	221,437
1911	155,637	90,450	7,009	6	253,102
1912	180,497	106,301	7,531	158	294,487
1913	197,666	120,384	7,481	239	325,770
1914	210,216	136,338	8,691	302	355,547
1915	222,936	155,759	9,155	353	388,192
1916	226,533	169,145	9,685	381	405,744
Nine years' gain	119,738	123,610	4,374	381	248,103

THE Dayton (O.) Gas Company has withdrawn its appeal to the Ohio Utilities Commissioners from the Dayton gas rate ordinance, which fixed rates for 10 years from July 1, 1915. Attorneys for the company explained that the city commission subsequently enacted an ordinance fixing the rates from April 1, 1916, which the company had accepted, and which repealed the former ordinance to which it had objected.

SEVENTY employees of the Pittsfield Coal Gas Company went to North Adams, Mass., in eight motor trucks and automobiles on June 3rd, for an outing, as the guests of the North Adams gas employees. The party left Pittsfield at 12 o'o'clock, and arrived at North Adams at 1:30. A lunch was served and afternoon sports were enjoyed as much as the weather would permit. A dinner was served about 5 o'clock and the return trip was made early in the evening. In spite of the stormy weather, all had a very enjoyable time. The North Adams employees won all the sports of the afternoon, from the foot race to the baseball games.

WITHIN the next two months, the Easton (Pa.) Gas Works will begin the erection of a modern coal gas plant on the property on the "Seventh ward flats," formerly occupied by the Easton Foundry and Machine Company. The plant provides for the manufacture of 3,000,000 feet per day, three times the capacity of the plant on North Front street. The first unit to be erected on the new property will have a capacity of 1,000,000 feet, and will be operated in connection with the present plant. After the first unit has been completed, work will be begun on a second unit of similar capacity. Operated in connection with the Front street plant, the company's output will then be 3,000,000 feet. The outlay, it is said, will be in the neighborhood of $250,000.

THE Mobile (Ala.) Gas Company has decided that the interior of their office building is not commensurate with the progress of the company and are remodeling it. The walls will be trimmed in mahogany, and there will be a new tile floor and new office fixtures of the latest model.

THE New Britain (Conn.) Gas Light Company reports an increase in business both in gas sold and appliances sold, of about 20% over a year ago. "Collections are good but we are having a great deal of difficulty in securing common labor, and are crippled in making extensions on this account. Labor is also restless and seems to prefer not to work full time."

THE Northern Indiana Gas and Electric Company is offering coke in Ft. Wayne at $5.45 per ton, bills not to be rendered until October 1st. This price will be allowed only until their surplus accumulations of coke are sold.

THE Mayor and City Attorney of Kalamazoo, Mich., have prepared an ordinance fixing a flat rate of 75 cents per 1,000 cubic feet for gas, allowing the company a 10-cent collection fee if bill is not paid within 15 days after presented to the consumer. The ordinance will also require a 600 B. T. U. standard and provide for regular weekly inspection of the quality of the gas. The tests will either be made by the city engineer or the public utilities commission. The present franchise of the Michigan Light Company expires June 30, according to the city's contentions.

FOR the most part, old officers were re-elected at the meetings of directors of the Ohio Cities Gas Company and subsidiaries. Three new directors met with the board of the Columbus Gas and Fuel Company, C. L. Braun, F. N. Sinks and C. E. Woolman. Officers elected are: B. G. Dawes, president; John W. Lansley, vice-president, and G. C. Scott, secretary. Directors and officers of other companies in the organization remain as before.

THE Atlanta (Ga.) Gas Light Company has started work extending its mains to College Park and East Point. In all, some 12 miles of welded joint main will be laid, and a compressor station will be built at the works.

EDWARD F. DAVIS for some time in the Industrial Fuel Department of the Brooklyn Union Gas Company has been appointed Industrial Fuel Expert for the Needham Gas Appliance Company recently organized.

G. I. VINCENT,
President, Iowa District Gas Association.

MR. VINCENT (author of paper found on page 394 in this issue) was born in Philadelphia in 1877, and attended the Philadelphia public schools and high school and the University of Pennsylvania, graduating in mechanical engineering in 1898; and subsequently took the degree of Mechanical Engineer at the same institution in 1902.

He was employed by the United Gas Improvement Company in Philadelphia as street clerk in 1898, and held various positions in the Philadelphia distribution department; going to Des Moines in 1905 as engineer of the Des Moines Gas Company, which position he still holds.

He is a member of the American Society of Mechanical Engineers, the American Gas Institute, National Commercial Gas Association, Iowa District Gas Association, Des Moines Engineers' Club; and is an active committee worker in all of them.

CARL BROOKE, assistant auditor of the Milwaukee (Wis.) Coke and Gas Company, delivered a lecture on "Accounting," at the Alexander Hamilton Club's dinner in the Hotel Pfister, a couple of weeks ago. A large attendance greeted Mr. Brooke.

GOVERNOR HARRINGTON, of Maryland, has appointed Philip D. Laird, of Montgomery County, a member of the Public Service Commission. Mr. Laird returns to the commission after an absence of over a year, succeeding Judge Henry, whom Governor Goldsborough appointed to succeed Albert G. Towers, when promoted to the chairmanship of the commission, to succeed Mr. Laird. Since resigning, Mr. Laird has regained his health, which became impaired because of close attention to his work. Mr. Laird was appointed a member of the commission by the late Governor Crothers when it was created by an act of the Legislature in 1910. When Judge Ambler, who was chairman, was elected in 1911 to the Supreme bench, Mr. Laird succeeded him as head of the commission, and retained this position until ill health compelled his resignation.

W. P. GUINAN, new business manager of the Danbury and Bethel (Conn.) Gas and Electric Light Company, has been elected chairman of the Mercantile Bureau of the Danbury Chamber of Commerce. Mr. Guinan is also vice-president and a director of the latter organization, as well as a member of the publicity committee.

W. A. LEUENBERGER, superintendent of the Tacoma Gas Company, Tacoma, Washington, was elected a director of the Tacoma Rotary Club at the annual meeting held in Juue 1.

GENERAL GEORGE H. HARRIES, a vice-president of H. M. Byllesby & Company, made the Memorial Day address at Omaha's commemoration. The following from the "Nebraskan" indicates the trend of editorial comment: "A great speech. It is a strong and eloquent presentation of facts which are at this time all important to the American people. These facts are presented by a man who has had the practical experience necessary to a complete understanding of the crisis confronting our country; a man who has served the colors on the field of battle and who holds those colors ensnarined in his heart."

Financial Notes.

WHILE the European war has greatly stimulated business in manufacturing and metal-producing centers, the reverse has been true in many lumber and agricultural districts, including those served by the operating subsidiaries of the AMERICAN POWER AND LIGHT COMPANY, according to F. G. Sykes, President of the company, in his annual report for 1915. However, he says: "It is especially gratifying to note that in spite of the adverse business conditions in all the territory served, the combined earnings, have increased, thus clearly indicating that with a return to normal conditions, the growth of earnings should be very substantial. At the beginning of the European war the company had under construction projects, which, to complete, involved approximately $3,500,000. The completion of these projects, with further extensions and the acquisition of the Galvesten Gas Company and some smaller properties, has added approximately $5,400,000 to capital account. This has increased fixed charges slightly more than the increase in net earnings during the calender year 1915. However, it should be borne in mind that a considerable part of the new plants are not yet fully utilized. The earning statement for the year ended December 31, 1915, follows:

Gross earnings		$1,275,687
Expenses		264,638
Net earnings		$1,011,049
Interest and discounts		493,602
Net income		$517,447
Combined net surplus of the subsidiaries after payment of dividends	$193,140	
Transferred to reserve for depreciation	159,000	
Balance undistributed surplus	$34,410	
Less amount accruing to common stock not owned by American Power and Light Company	2,367	
Balance acruing to American Power and Light Company		32,043
Total net income accruing to American Power and Light Company		$549,490
Less preferred stock dividends paid		203,734
Balance		$345,756
Common stock dividends		328,216
Balance combined surplus		17,540
Surplus American Power and Light Company Dec. 31, 1914		326,536
Surplus Dec. 31, 1914, of subsidiaries	$983,992	
Less amount accruing to common stock not owned by American power and Light Company	13,092	
Balance surplus accruing to American Power and Light Company		970,900
Balance combined surplus accruing to American Power and Light Company		$1,314,976

THE INTERNATIONAL TRACTION COMPANY, controlled by the United Gas and Electric Corporation, has declared initial dividend of 1¾% on common stock and regular quarterly dividends of 1¾% on first preferred stock and 1% on its 4% preferred stock, and a dividend of 42% on its 4% preferred stock, paying up all accumulated dividends on latter stock. All these dividends are payable July 1.

THE Board of Public Utility Commissioners of New Jersey, has permitted the PUBLIC SERVICE GAS COMPANY to issue an additional $1,000,000 of stock.

PETITIONS have been filled with the Second District Public Service Commission, New York, by the LONG ISLAND LIGHTING COMPANY, of Northport, for authority to purchase the entire capital stock of the Suffolk Gas and Electric Light Company, and to merge the same with the Long Island Lighting Company, and to issue an additional $200,000, par value, of capital stock of the latter company; and for authority to purchase the entire capital stock of the South Shore Gas Company, and to merge with to the Long Island Lighting Company, and to issue an additional $63,300, par value, of the capital stock of the Long Island Lighting Company. A petition has also been filed by the Long Island Lighting Company, the Huntington Lighting Company, the Huntington Light and Power Company and the Huntington Gas Company for approval of the purchase and transfer to the Long Island Lighting Company of all the property and assets of the two latter companies, and for authority to issue therefor $120,000, par value, of capital stock, and $206,000, par value, of first mortgage 5% 25 year bonds of the Long Island Lighting Company, under a mortgage heretofore approved by the Commission; and for approval of a supplemental indenture of mortgage.

THE California Railroad Commission has authorized the SAN DIEGO CONSOLIDATED GAS AND ELECTIC COMPANY, a subsidiary of Standard Gas and Electric Company, to acquire at $14 a share the 1,619 shares of capital stock of the Oceanside Electric and Gas Company.

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO., N. W. CORNER BROAD AND ARCH STS., PHILADELPHIA, June 14, 1916.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable July 5, 1916, to stockholders of record at the close of business, June 30, 1916. Checks will be mailed.

3041-4 I. W. MORRIS, Treasurer.

Current Prices of Public Utility Securities.

	Bid.	Asked.
American Gas Co	120	122
*American Gas & Electric	146	148
*American Gas & Electric pf	50	52
American Light & Traction	381	386
American Light & Traction pf	110½	112½
American Power & Light	70	71
American Power & Light pf	85	86½
American Public Utilities	45	47
American Public Utilities pf	76	79
Associated Gas & Electric pf	55	65
Atlantic P. & L. pf	92	95
Brooklyn Union Gas Co	127	130
Cities Service	278	280
Cities Service pf	87	88
Colorada Power	24	25
Colorado Power pf	99½	101
*Commonwealth Pr., Ry. & Lt	64½	65
*Commonwealth Pr., Ry. & Lt. pf	84½	86
Consolidated Gas Co	138	139
Denver Gas & Electric gen. 5s	97	99
Electric Bond Deposit pf	85	86
Electric Bond & Share pf	100	102
Federal Light & Traction	12	14
Federal Light & Traction pf	45	49
Gas & Electric Securities	275	...
Gas & Electric Securities pf	100	...
Laclede Gas	106	107
Northern States Power	80	81
Northern States Power pf	96	97½
Pacific Gas & Electric	58	59
Pacific Gas & Electric, original	89	91
Pacific Gas & Electric 1st pf	89	90
Public Service	129	130
Republic Ry. & Light Co	35	36
Republic Ry. & Light Co. pf	76	78
*Standard Gas & Electric	14	14½
*Standard Gas & Electric pf	40	42
Tennessee Ry., Light & Power	11½	12½
Tennessee Ry., Light & Power pf	52	53
Toledo Trac., Light & Power	45	47
Toledo Trac., Light & Power pf	80	83
*United Gas Improvement Co	88	89
United Light & Railways	52	54
United Light & Railways 1st pf	77	79

*Par value $50